Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 8s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Evidence - Based Physiotherapy Interventions for Specific Paediatric Cancers -A Scoping Review

Theivaseelan Suwarnnasabaesan[1], Swetha. S. R[2], S. Sridevi[*3]

[1]Theivaseelan Suwarnnasabaesan (TS)- Intern

[2]Intern, Sri Ramachandra Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research, Chennai 600116.

***Corresponding Author:**

Associate Professor

Email ID: devibsmoorthy@sriramachandra.edu.in

Cite this paper as: Theivaseelan Suwarnnasabaesan, Swetha. S. R, S. Sridevi, (2025) Evidence - Based Physiotherapy Interventions for Specific Paediatric Cancers -A Scoping Review. *Journal of Neonatal Surgery*, 14 (8s), 407-413.

ABSTRACT

Childhood cancer has a different clinical and histological presentation from that of adults, and it causes are still unclear. The most common type of cancer in this age group are leukaemia, lymphomas and tumours of the central nervous system. Physiotherapy interventions that are supported by evidence can significantly speeds up recovery and improve overall quality of life. The purpose of this scoping review is to investigate the available evidence-based interventions for particular paediatric cancers. Identify the effectiveness of physiotherapy approaches used for various paediatric cancer types and understand any gaps in the current evidence to guide the future research. A comprehensive literature search was carried out across PubMed and Google Scholar. This study covered English- language studies published between 2014 and 2024, involving patients diagnosed with particular paediatric cancer. Relevant studies targeting on physiotherapy interventions such as structured therapeutic exercise programs that lasted between 3 – 40 weeks, frequency 3 – 11 sessions/week, duration 15 -180 min, balance and coordination training, whole body vibration, active video gaming and constrained- induces movement therapy stated enhancements in muscle strength, physical fitness and functionality. This scoping review brought attention to the areas that require additional research to expand the body of evidence and highlights the importance of tailored physiotherapy treatments for paediatrics cancer patients.

Keywords: *leukemias, lymphomas, solid tumors, paediatrics, evidence-based physiotherapy*

1. INTRODUCTION

The clinical and histological presentation of childhood cancer differs from that of adult cancer, and its causes are not yet well defined. Leukemias, lymphomas and tumors of the central nervous system are the most common form of cancer in this age group [1]. Evidence based physiotherapy interventions can significantly enhance recovery and improve overall quality of life. Physiotherapy interventions that are supported by evidence can significantly speeds up recovery and improve overall quality of life. Children's physical and functional abilities are adversely impacted by the high-level therapies, which often result in temporary or permanent disability. Interventions in Interventions in physiotherapy supported by evidence have become necessary in decreasing these rehabilitation techniques have therefore gained importance in the paediatric oncology, and also proven promising results in minimising these deficits, raising the overall healing process and recovering motor functions. Physiotherapy can help address the muscular and skeletal impairment associated with cancer treatment and uplift cardiovascular fitness, flexibility and strength. Furthermore, Physical interventions target to enhance the child's functional independence facilitating capability to return to school, social activities and distinct feature of normal life [2].

2. METHODOLOGY

A total of 18 articles were initially identified through various platforms. After the screening processes 8 articles were included into this study.

Inclusion criteria

- Studies involving patients diagnosed with particular paediatric cancer.
- Studies involving physiotherapy interventions as treatment method.
- Studies published in English between 2014-2024

Exclusion criteria

- Studies involving animals.
- Studies focusing on medical management as a treatment method.

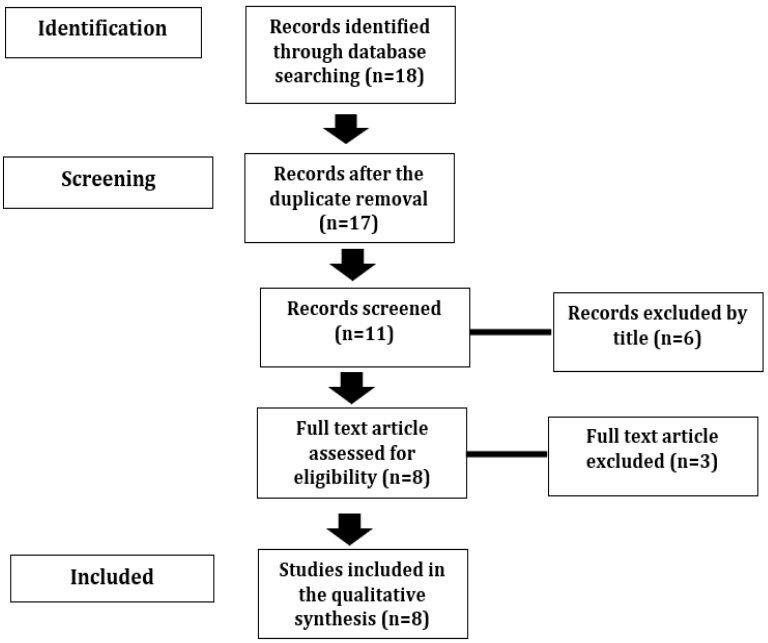

Figure 1. Flow diagram of the search strategy using PRISMA.

Table 1: Summary of Studies Included in The Review

AUTHOR	YEAR OF PUBLICATION	SAMPLE SIZE	TOPIC	STUDY DESIGN	CONCLUSION	INTERVENTIONS
Katja I. Braam et al [3]	2018	68	The effects of combined physical and psychosocial training on physical fitness, psychosocial function, and health-related quality of life (HRQOL) in children with cancer.	RCT	Combined physical and psychosocial training was well-received and followed. No short-term effects, but long-term gains were seen in muscle strength. Both groups improved in bone density and HRQOL over time.	Aerobic exercises Weight-bearing exercises Circuit training Progressive intensity (66-100% HR peak) Home-based exercise program with music guidance.
Fiuza-Luces C et al [4]	2017	40	Investigating the effects of a structured exercise program on the immune function of pediatric patients with solid tumors.	RCT	The exercise program was found to have a beneficial effect on immune function, showing improvements in various immune parameters. The study concluded that exercise could be a valuable adjunct therapy to improve immune function and overall health outcomes in pediatric	Aerobic exercises Strength training Supervised physical activity

					cancer patients undergoing treatment.	
Kohler BE et al [5]	2024		Goal-directed therapeutic exercise for paediatric posterior fossa brain tumour survivors: a qualitative analysis of experiences	RCT	The study aims to determine the feasibility and potential benefits of a targeted exercise program in pediatric brain tumor survivors, addressing the long-term physical challenges they face. While the full conclusion is not available in the abstract, the focus is on improving health-related quality of life through exercise.	Structured Therapeutic Exercise Program Physical Activity Enhancement Strength and Mobility Exercises Balance and Coordination Training Individualized Approach
Morales JS et al [6]	2020	40	Investigating the effects of an in-hospital exercise program on physical function and quality of life in children undergoing cancer treatment.	Prospective cohort study	In-hospital exercise was found to be safe and feasible for children undergoing cancer treatment. The exercise program significantly improved physical fitness, functional mobility, and quality of life for the children involved.	Aerobic exercises & Resistance training Flexibility training Balance exercises Play-based activities
Brooke Kohler et al [7]	2022		Therapeutic exercise interventions in pediatric survivors of brain cancer and other solid tumors-A Scoping Review	Scoping review	A small number of mostly low methodological quality studies have examined the effects of therapeutic exercise in pediatric survivors of solid tumors. Although limited, the extant literature supports the feasibility and safety of therapeutic exercise interventions for pediatric survivors of brain cancer and other solid tumors.	Aerobic exercise Resistance training Stretching & Yoga Active video gaming Constraint-induced movement therapy (CIMT)
Ospina PA et al [8]	2021		Physical therapy interventions in children and adolescents before, during, and following cancer treatment	Systematic Review	The review found that specific physical therapy interventions may help mitigate the long-term effects of cancer treatments on physical function in children and adolescents. However, more high-quality randomized controlled trials are needed to draw conclusive results.	Aerobic Exercise Strength Training Balance and Coordination Exercises Functional Training Postural Training
Laura S	2018	65	Short-Term Recovery of	Prospective cohort	Mild to moderate balance impairments	Balance Training

Gilchrist et al [9]			Balance Control: Association with Chemotherapy-Induced Peripheral Neuropathy in Pediatric Oncology	study	improve but can persist, even when CIPN has improved, 6 months after treatment for childhood cancer.	Strength Training Gait Training Sensory Re-education Coordination Exercises
Vanessa Rustler et al [10]	2018	9 studies with the total of 274 participants	Whole-body vibration (WBV) therapy in children with disabilities and its potential therapeutic benefits for pediatric cancer patients.	Systematic Review	WBV appears to be a safe, compliant, and effective therapy for improving physical function in children with disabilities. The largest effects were seen in muscle mass and strength, balance, gait, and walking ability. The findings suggest WBV could also benefit pediatric cancer populations, though further research is needed	Whole body vibration

Table 2: Quality Appraisal Using PEDro Scale

Author	Year of publication	PEDro scale
Katja I. Braam et.al	2018	9/10
Fiuza-Luces C et.al	2017	7/10
Kohler BE et.al	2021	4/10
Morales JS et.al	2020	4/10
Brooke Kohler et.al	2022	7/10
Ospina PA et.al	2021	1/10
Laura S Gilchrist et. al	2018	3/10
Vanessa Rustler et.al	2018	1/10

3. RESULT

As indicated by these studies in paediatric oncology physiotherapy, Children's physical abilities can be impacted by cancer and its intensive therapies which highlights the importance of targeted interventions to address these functional impairments. Physiotherapy is the key to improving functional independence and quality of life by addressing the impairments effectively.

Exercise Therapy

Exercise therapy is one of the principal interventions for paediatric cancer patients, which strives to decrease the adverse effects of treatment related complications like exhaustion, endurance loss and muscle weakness. Kohler BE et al [5] reported that therapeutic regimens lasting from 3 to 40 weeks, with frequencies of 3 to 11 sessions per week and session durations from 15 to 180 minutes, led to substantial improvements. Boosted cardiovascular endurance, muscle strength, and overall functionality were the outcomes of these exercise regimens. These organised workout plans help neutralize the physical deconditioning, that takes place frequently in paediatric cancer patients, thereby promoting long-term recovery and physical health [3] [4] [6]. For pediatric cancer survivors, aerobic exercise is a harmless and attainable intervention, supporting in minimizing the long-term effects of treatment on physical function. While Brooke Kohler et al. [7] support its use in survivors of brain cancer and solid tumors, Ospina PA et al. [8] bring focus to high-quality trials to confirm its effectiveness.

Active Video Gaming

Based on research conducted by Brooke Kohler et al [7], incorporating active video gaming into paediatric rehabilitation provide a unique and entertaining way to increase children's physical activity levels. This approach works effectively well for children, whose therapies are deconditioning them. Children more likely to participate in physical exercise when video games are featured into the rehabilitation process this enhances their physical fitness, motor skills, and, most notably, their overall enjoyment of the therapy as a whole. For paediatric cancer survivors, these games deliver an enjoyable and engaging substitute for traditional exercise, possibly strengthening adherence and promoting well-being.

Balance & Coordination Training

Paediatric cancer patients regularly experience Chemotherapy-related neuropathies, which habitually results in long-term impairments in balance and coordination. The value of balance training programmes which deploy equipment like balance boards or target and diminish these deficiencies, was scrutinized by Laura S.Gilchrist et al[9]. In the final analysis this type of training increases children's independence and mobility by restoring postural control and coordination that are vital for daily tasks and promoting prevention of falls. This kind of therapeutic approach is notably worthwhile for those with intense neuropathy, where long-term rehabilitation is needed to retrieve motor function [8] [5] [6].

Constraint-Induced Movement Therapy (CIMT)

A focused therapy called Constraint-Induced Movement Therapy is tailored for children who have survived cancer and have motor impairments as a consequence of adverse effects such brain tumours or neurological harm from radiation or chemotherapy. Drawing from the studies conducted by Brooke Kohler et al [7] CIMT promotes the affected limb usage by restricting movement of the unaffected one, thus optimizing motor function recovery and also elevates functional outcomes by improving motor control and facilitating self-reliance in everyday routines. Paediatric cancer survivors with unilateral motor impairments obtains the most advantage from it, since it contributes to regain self-confidence and functional competence in their affected limb.

Whole-Body Vibration (WBV)

Derived from the research led by Vanessa Rustler et al [10] pointed out Whole Body Vibration therapy as the state of art technique that can be particularly beneficial for children with physical disabilities, including those resulting from cancer treatments. WBV has shown improvements in muscle mass, strength, balance, gait, and walking ability, indicating its Likely usefulness in paediatric cancer rehabilitation. While the therapy has Illustrated a powerful effect on muscle function and physical performance in other paediatric populations, its execution in cancer rehabilitation remains an area demanding more investigation. Nonetheless, early results suggest that WBV could be an effective adjunct to traditional physiotherapy in this group, particularly for those undergoing significant physical deterioration.

The result shows Physiotherapy approaches are tailored to address specific type of cancer-related weaknesses. WBV promotes physical wellness, CIMT target motor and coordination deterioration and also exercise therapy and active video gaming help to restore physical strength, balance training. These strategies enhance personal independence and well-being of pediatric cancer patients and survivors, stressing the attention of physiotherapy in their care.

4. DISCUSSION

The discussion underscores several critical aspects regarding the status quo of physiotherapy interventions for paediatric cancer patients, pointing out to the gaps and opportunities in research, personalized treatment approaches and interdisciplinary collaboration.

Lack of Tumor-Specific Research

This review identifies the inadequacy of tumor-specific research in physical therapy is one of the main problems. Irrespective of the cancer type, current interventions often take a broad scope to rehabilitation, which can confine their effectiveness. Different cancers, such as brain tumors, sarcomas or leukemia, can present unique physical and activity-based limitations owing to both the tumor's site and the designated treatments used. For instance, a child with leukemia may face severe fatigue and musculoskeletal, while a child deconditioning a brain tumor might experience significant neurological deficits. The lack of studies concentrating on development of physiotherapy protocols targeted to these tumor-specific challenges-oriented rehabilitation strategies can better address the unusual physical and functional impairments caused by cancer, ensuring that physiotherapy is not a one-size-fits-all strategy.

Interdisciplinary Collaboration

In order to accelerate patient care, this scoping review highlights the significance of nurturing stronger multidisciplinary interaction between physiotherapists, oncologists, and other medical experts. Radiation therapy, chemotherapy, surgical procedures, and other medical interventions that might have critical negative health consequences are all part of the complicated process of cancer management. Working in unison with oncologists to create coordinated treatment plans that incorporate exercise and rehabilitation as standard aspects of cancer management, physiotherapy ought to be a vital part of this treatment plan. By focusing the physical and psychological impacts of cancer and its treatment, holistic care teams can

guarantee that rehabilitation methods are customized to each patient's unique requirements. On top of that, based on the patient's progressing health status, this association permits personalized changes to wellness plans, which may impact in more noteworthy result.

Lack of Long-Term Data

Despite the proven short-term advantages of physiotherapy for paediatric oncology patients, this scoping review identifies a significant lack of strong evidence. Improvements in muscle strength, cardiovascular endurance, and functional independence during or soon after treatment are examples of early impacts or brief period noteworthy results that are often the focus of the most of the research work. Studies on the effects of physiotherapy approaches on paediatric cancer patients' well-being, longevity, and long-term healing is, nevertheless, critically lacking. This is especially imperative because many paediatric cancer survivors experience prolonged physical, cognitive and emotional difficulties. Thus, more studies needed for understanding how physiotherapy can support long-term physical and functional health, particularly as survivors age and deal with specific health risks associated with their past cancer care.

Variability in Intervention Approaches

This study also finds out broad differences in remedial methods used in paediatric cancer rehabilitation can be. In paediatric cancer rehabilitation, up to the present there is no consistent or structured approaches used for physiotherapy interventions, which ranges from cardiovascular activities and strength training to stretching exercises, balance training, postural control, coordination exercises and stability training. Despite the requirement for tailored therapeutic strategies is exhibited in this variation, the irregularity may also make it harder to compare study outcome and create clinically proven recommendations. Furthermore, the majority of interventions are unremarkable rather than customized for specific type of cancer or treatment plans. In order to guarantee that patients acquire evidence-backed, successful approaches that serves to their particular needs, future research should push for standardize some components of rehabilitation while maintaining flexibility in patient-centred care.

Age and Treatment Considerations

This scoping review point outs how crucial it is to tailor physiotherapy therapies according to the patient's age, developmental stage, and type of treatment there are undergoing, as well as the type of cancer. Young children, teenagers, and young adults all have particular hurdles from beginning to end of cancer treatment and rehabilitation, and also pediatric cancer patients shows substantial differences in their physical and cognitive development. Furthermore, as per the child's age and developmental stage, the method of treatment- radiation, chemotherapy or surgical intervention-may have fluctuating effects. In order to assure that approaches are suitable for the child's developmental competencies and the distinct complications of their treatment, physiotherapy protocols need to be modified to align with specific demands of various age groups. For paediatric patients, play-based therapy, age-specific exercise programs, and family contribution are fundamental to make rehabilitation fun and fruitful.

This discussion presents overlooked aspects of physiotherapy research and clinical practice in paediatric oncology, requiring cancer-specific research, tailored interventions, interdisciplinary collaboration and long-term studies. Rectifying these gaps will boost short- and long-term outcomes for paediatric cancer patients, enhancing their quality of life, self-governance, physical outcomes and social reintegration.

5. CONCLUSION:

Using evidence-based physiotherapy practices is key to bettering the functional and physical results of paediatric cancer patients. In India, there are less amount of evidence in this specific area of physical therapy. By addressing treatment-related defiencies such as breathing problems, and muscle weakness, these tailored strategies improve quality of life and long-term survival of paediatric cancer survivors.

However, to optimize better care for these vulnerable populations, more research analysis and innovation are required. Although the short-term effects are deeply proven, long-term follow-up studies are still necessary to acquire a better understanding of the long-term after effects on survivorship and recovery.

ETHICAL APPROVAL

Not applicable

CONSENT TO PARTICIPATE

Not applicable

CONSENT TO PUBLISH

Not applicable

AUTHORS CONTRIBUTIONS

TS contributed to the conceptualization and design of the study. TS and SR were involved in data collection and contributed to the initial drafting of the manuscript.

SSD contributed to the analysis, interpretation of results, and manuscript revision. She also

provided critical feedback and acted as the corresponding author.

FUNDING

This study did not receive any funding.

COMPETING INTERESTS

No potential conflict of interest was reported by the author.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

During the preparation of this work the author(s) used ChatGPT in order to do the paraphrasing. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

REFERENCES

[1] Scarlat da Silva Santos S, Ribeiro RM, Guimarães et al. Effects of physical exercise during hospitalization in children and adolescents with cancer: a systematic review. Rev Paul Pediatr. 2021;39:e2020034. doi:10.1590/1984-0462/2021/39/2020034.

[2] Ortiz-Campoy S, Lirio-Romero C, Romay-Barrero et al. The role of physiotherapy in pediatric palliative care: a systematic review. Children (Basel). 2021;8(11):1043. doi:10.3390/children8111043.

[3] Braam KI, van Dijk-Lokkart EM, Kaspers GJL et al. Effects of a combined physical and psychosocial training for children with cancer: a randomized controlled trial. BMC Cancer. 2018;18(1):1289. doi:10.1186/s12885-018-5181-0.

[4] Fiuza-Luces C, Padilla JR, Valentín J et al. Effects of exercise on the immune function of pediatric patients with solid tumors: insights from the PAPEC randomized trial. Am J Phys Med Rehabil. 2017;96(11):831-837. doi:10.1097/PHM.0000000000000757.

[5] Kohler BE, Baque E, Sandler CX et al. Goal-directed therapeutic exercise for paediatric posterior fossa brain tumour survivors: a qualitative analysis of experiences. Support Care Cancer. 2024;32(2):125. doi:10.1007/s00520-024-08327-3. PMID: 38252320; PMCID: PMC10803389.

[6] Morales JS, Santana-Sosa E, Santos-Lozano et al. In-hospital exercise benefits in childhood cancer: a prospective cohort study. Scand J Med Sci Sports. 2020;30(1):126-134. doi:10.1111/sms.13545.

[7] Kohler BE, Baque E, Sandler CX et al. Physical ACTivity in Survivorship (PACTS): study protocol for a randomized controlled trial evaluating a goal-directed therapeutic exercise program in pediatric posterior fossa brain tumor survivors. BMC Pediatr. 2021;21(1):105. doi:10.1186/s12887-021-02566-7.

[8] Ospina PA, McComb A, Pritchard-Wiart LE et al. Physical therapy interventions, other than general physical exercise interventions, in children and adolescents before, during and following treatment for cancer. Cochrane Database Syst Rev. 2021;8(8):CD012924. doi: 10.1002/14651858.CD012924.pub2.

[9] Gilchrist LS, Tanner LR. Short-term recovery of balance control: association with chemotherapy-induced peripheral neuropathy in pediatric oncology. Pediatr Phys Ther. 2018;30(2):119-124. doi:10.1097/PEP.0000000000000484